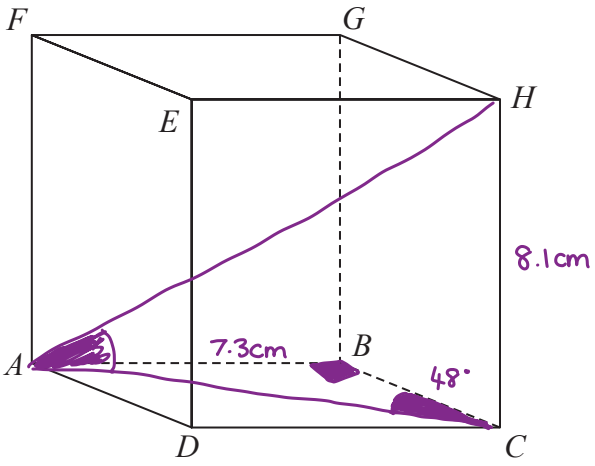
1. *ABCDEFGH* is a cuboid.

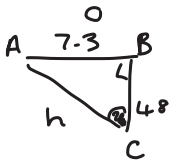


$AB = 7.3$ cm
$CH = 8.1$ cm
Angle $BCA = 48°$

∠HCA and ∠ABC must be 90° as we are working with a cuboid.

Find the size of the angle between *AH* and the plane *ABCD*.
Give your answer correct to 1 decimal place.

Calculating AC:



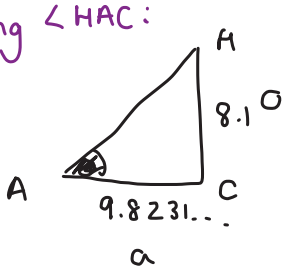
$\sin\theta = \frac{O}{h}$

$\sin 48 = \frac{7.3}{AC}$ (1)

$AC = \frac{7.3}{\sin 48} = 9.8231...$ (1)

↑ Use the exact value in calculations

Finding ∠HAC:



$\tan\theta = \frac{O}{a}$

$\tan\theta = \frac{8.1}{9.8231...}$ (1)

$\theta = \tan^{-1}\left(\frac{8.1}{9.8231...}\right)$

$= 39.508$

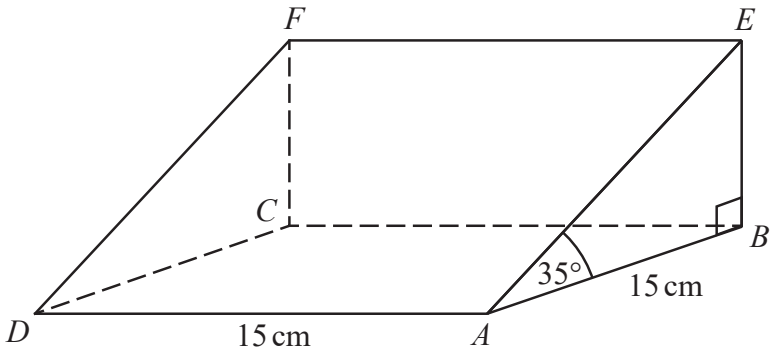
$= 39.5$ ← round to 1dp.

(1)

39.5 °

(Total for Question is 4 marks)

2. The diagram shows a triangular prism.



The base, *ABCD*, of the prism is a square of side length 15 cm.
Angle *ABE* and angle *CBE* are right angles.
Angle *EAB* = 35°

M is the point on *DA* such that

$$DM : \quad = 2 : 3$$

Calculate the size of the angle between *EM* and the base of the prism.
Give your answer correct to 1 decimal place.

(1) 15 cm

D 6cm M 9cm A

DM = $\frac{2}{5}$ × 15 = 6 cm.

MA = $\frac{3}{5}$ × 15 = 9 cm

DM : MA = 2 : 3

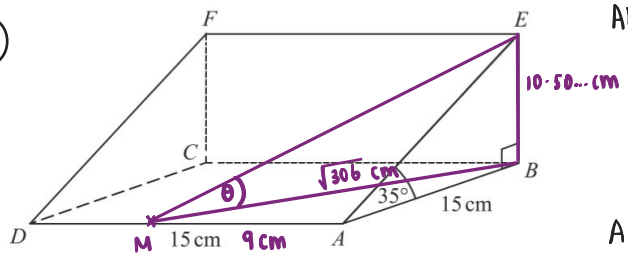
DA split into 5 parts.

DM has 2 of these 5 parts.

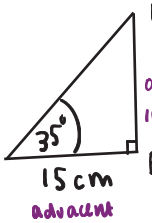
MA has 3 of these 5 parts.

(1)

(2)



ABE is a right angled triangle.

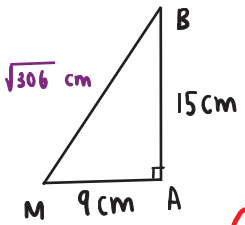


Find length EB:

tan35 = $\frac{EB}{15}$ (1)

∴ EB = 10·50311307... cm

(3) MAB is a right-angled triangle.



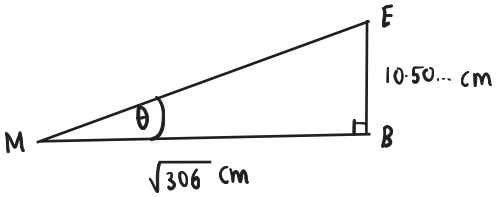
$a^2 + b^2 = c^2$

$9^2 + 15^2 = (MB)^2$

$MB = \sqrt{15^2 + 9^2} = \sqrt{306}$

(1)

(4)



$\theta = \tan^{-1}\left(\frac{10.50...}{\sqrt{306}}\right) = 30.9815... \approx 31.0°$

(1)

31.0 °

(Total for Question is 4 marks)